

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

TQ DELTA, LLC,

Plaintiff;

v.

Civil Action No. 13-1835-RGA

2WIRE, INC.,

Defendant.

MEMORANDUM OPINION

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Attorneys for Defendant.

August 16, 2021

/s/ Richard G. Andrews

ANDREWS, U.S. DISTRICT JUDGE:

Before the Court is Defendant's Motion for Summary Judgment of Invalidity of the Family 4 Patents (D.I. 1460) and Plaintiff's Motion for Summary Judgment of No Invalidity (D.I. 1470).

I have considered the parties' briefing. (D.I. 1461, 1471, 1513, 1519, 1526, 1539).

I. BACKGROUND

Plaintiff TQ Delta filed suit against Defendant 2Wire alleging infringement of twenty-four patents that span six different patent families. (D.I. 6). The Court divided the case into separate trials based on the patent families. (D.I. 280). This motion concerns the Family 4 Patents, U.S. Patent Nos.: 7,292,627 ("the '627 Patent"), 8,090,008 ("the '008 Patent"), and 8,073,041 ("the '041 Patent"). The patents-at-issue are directed to a system and method for scrambling the phase characteristics of carrier signals. Plaintiff accuses Customer Premise Equipment ("CPE") products. (D.I. 1479-1, Exh. A at 48 of 163). Plaintiff alleges infringement of Claim 26 of the '627 Patent, Claim 14 of the '008 Patent, and Claim 14 of the '041 Patent. Claim 26 of the '627 Patent depends on Claim 20. Claim 20 recites:

20. A multicarrier modulation transceiver that uses a transmission signal having a plurality of carrier signals for modulating an input bit stream, each carrier signal having a phase characteristic associated with the input bit stream, wherein the multicarrier modulation transceiver is capable of associating each carrier signal with a value determined independently of any input bit value carried by that carrier signal, computing a phase shift for each carrier signal based on the value associated with that carrier signal and combining the phase shift computed for each carrier signal with the phase characteristic of that carrier signal so as to substantially scramble the phase characteristics of the plurality of carrier signals.

'627 Patent at cols. 11:64-12:11. Claim 26 recites:

26. The transceiver of claim 20 wherein the value varies with each DMT symbol.

Id. at col. 12:30-31.

Claim 14 of the '008 Patent recites:

14. A multicarrier system including a first transceiver that uses a plurality of carrier signals for modulating a bit stream, wherein each carrier signal has a phase characteristic associated with the bit stream, the transceiver capable of:

associating each carrier signal with a value determined independently of any bit value of the bit stream carried by that respective carrier signal, the value associated with each carrier signal determined using a pseudo-random number generator;

computing a phase shift for each carrier signal based on the value associated with that carrier signal; and

combining the phase shift computed for each respective carrier signal with the phase characteristic of that carrier signal to substantially scramble the phase characteristics of the plurality of carrier signals, wherein multiple carrier signals corresponding to the scrambled carrier signals are used by the first transceiver to modulate the same bit value.

'008 Patent at cols. 11:41-12:14.

Claim 14 of the '041 Patent recites:

14. A multicarrier system including a first transceiver that uses a plurality of carrier signals for receiving a bit stream, wherein each carrier signal has a phase characteristic associated with the bit stream, the transceiver capable of receiving the bit stream, wherein:

each carrier signal is associated with a value determined independently of any bit value of the bit stream carried by that respective carrier signal, the value associated with each carrier signal determined by a pseudo-random number generator,

a phase shift for each carrier signal is based on:

the value associated with that respective carrier signal, and

the combining of a phase shift for each carrier signal with the phase characteristic of that respective carrier signal so as to substantially scramble the phase characteristics of the plurality of carrier signals,

multiple carrier signals corresponding to the plurality of phase shifted and scrambled carrier signals are used by the first multicarrier transceiver to demodulate a same input bit value of the received bit stream.

'041 Patent at cols. 11:42-12:16.

II. LEGAL STANDARD

A. Summary Judgment

“The court shall grant summary judgment if the movant shows that there is no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law.” Fed. R. Civ. P. 56(a). The moving party has the initial burden of proving the absence of a genuinely disputed material fact relative to the claims in question. *Celotex Corp. v. Catrett*, 477 U.S. 317, 330 (1986). Material facts are those “that could affect the outcome” of the proceeding, and “a dispute about a material fact is ‘genuine’ if the evidence is sufficient to permit a reasonable jury to return a verdict for the nonmoving party.” *Lamont v. New Jersey*, 637 F.3d 177, 181 (3d Cir. 2011) (quoting *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 248 (1986)). The burden on the moving party may be discharged by pointing out to the district court that there is an absence of evidence supporting the non-moving party’s case. *Celotex*, 477 U.S. at 323.

The burden then shifts to the non-movant to demonstrate the existence of a genuine issue for trial. *Matsushita Elec. Indus. Co. v. Zenith Radio Corp.*, 475 U.S. 574, 586–87 (1986); *Williams v. Borough of West Chester, Pa.*, 891 F.2d 458, 460–61 (3d Cir. 1989). A non-moving party asserting that a fact is genuinely disputed must support such an assertion by: “(A) citing to particular parts of materials in the record, including depositions, documents, electronically stored information, affidavits or declarations, stipulations . . . , admissions, interrogatory answers, or other materials; or (B) showing that the materials cited [by the opposing party] do not establish the absence . . . of a genuine dispute” Fed. R. Civ. P. 56(c)(1).

When determining whether a genuine issue of material fact exists, the court must view the evidence in the light most favorable to the non-moving party and draw all reasonable

inferences in that party's favor. *Scott v. Harris*, 550 U.S. 372, 380 (2007); *Wishkin v. Potter*, 476 F.3d 180, 184 (3d Cir. 2007). A dispute is "genuine" only if the evidence is such that a reasonable jury could return a verdict for the non-moving party. *Anderson*, 477 U.S. at 247–49. If the non-moving party fails to make a sufficient showing on an essential element of its case with respect to which it has the burden of proof, the moving party is entitled to judgment as a matter of law. *See Celotex Corp.*, 477 U.S. at 322.

B. Obviousness

A patent claim is invalid as obvious under 35 U.S.C. § 103 "if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains." 35 U.S.C. § 103; *see also KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406-07 (2007). "Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined." *KSR*, 550 U.S. at 406 (internal citation and quotation marks omitted).

A court is required to consider secondary considerations, or objective indicia of nonobviousness, before reaching an obviousness determination, as a "check against hindsight bias." *See In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1078-79 (Fed. Cir. 2012). "Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented." *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17–18 (1966). Where "the content of the prior art,

the scope of the patent claim, and the level of ordinary skill in the art are not in material dispute, and the obviousness of the claim is apparent in light of these factors, summary judgment is appropriate.” *KSR*, 550 U.S. at 427.

C. Anticipation

“To show that a patent claim is invalid as anticipated, the accused infringer must show by clear and convincing evidence that a single prior art reference discloses each and every element of a claimed invention.” *Silicon Graphics, Inc. v. ATI Tech., Inc.*, 607 F.3d 784, 796 (Fed. Cir. 2010). “[E]very element of the claimed invention [must be described], either expressly or inherently, such that a person of ordinary skill in the art could practice the invention without undue experimentation.” *Callaway Golf Co. v. Acushnet Co.*, 576 F.3d 1331, 1346 (Fed. Cir. 2009). As with infringement, the court construes the claims and compares them against the prior art. *See Enzo Biochem, Inc. v. Applera Corp.*, 599 F.3d 1325, 1332 (Fed. Cir. 2010). “While anticipation is a question of fact, it may be decided on summary judgment if the record reveals no genuine dispute of material fact.” *Encyclopaedia Britannica, Inc. v. Alpine Elecs. of Am., Inc.*, 609 F.3d 1345, 1349 (Fed. Cir. 2010).

III. ANALYSIS

Defendant has moved for summary judgment of invalidity and Plaintiff has moved for summary judgment of no invalidity. Defendant argues that U.S. Patent 6,625,219 to Stopler (D.I. 1474-7, Exh. G., hereinafter “Stopler”) anticipates claim 26 of the ’627 Patent and renders Claim 14 of the ’008 Patent and Claim 14 of the ’041 Patent obvious. (D.I. 1461 at 1). Defendant also asserts that the Asserted Claims are rendered obvious by a combination of U.S. Patent No. 5,682,376 to Hayashino et al. (D.I. 1474-8, Exh. H, hereinafter “Hayashino”) and U.S. Patent No. 6,590,893 to Hwang et al. (D.I. 1474-9, Exh. I, hereinafter “Hwang”). (D.I. 1461 at 1).

Plaintiff argues that it is entitled to summary judgment of no invalidity on all of those grounds. (D.I. 1471 at 6-8, 14-16). Plaintiff also moves for summary judgment of no invalidity on the basis that the Asserted Claims are not made obvious by the combination of Hwang and Stopler, the combination of T1.413-1998 and Hayashino, the combination of U.S. Patent No. 6,144,696 (D.I. 1474-10, Exh. J, hereinafter “Shively”) and Hayashino, or the combination of Stopler and the “Admitted Prior Art.” (*Id.* at 14-20). Plaintiff also contends that U.S. Patent No. 6,657,949 (D.I. 1475-5, Exh. E, hereinafter “Jones”) does not anticipate the Asserted Claims. (D.I. 1471 at 8-13).

A. Anticipation of Claim 26 of the '627 Patent by Stopler

Defendant argues that Claim 26 of the '627 Patent is anticipated by Stopler. Plaintiff, meanwhile, argues that Stopler does not anticipate this claim and has moved for summary judgment of no invalidity on this ground. (D.I. 1471 at 6).

Claim 26, a dependent claim, recites, “The transceiver of claim 20 wherein the value varies with each DMT symbol.” ('627 Patent at cols. 12:30-31). Claim 20 recites:

20. A multicarrier modulation transceiver that uses a transmission signal having a plurality of carrier signals for modulating an input bit stream, each carrier signal having a phase characteristic associated with the input bit stream, wherein the multicarrier modulation transceiver is capable of associating each carrier signal with a value determined independently of any input bit value carried by that carrier signal, computing a phase shift for each carrier signal based on the value associated with that carrier signal and combining the phase shift computed for each carrier signal with the phase characteristic of that carrier signal so as to *substantially scramble the phase characteristics of the plurality of carrier signals.*

Id. at cols. 11:64-12:11 (emphasis added). At claim construction, I construed “substantially scramble the phase characteristics of the plurality of carrier signals” to mean “adjust the phase characteristics of the carrier signals by varying amounts to produce a transmission signal with a reduced peak to-average power ratio (PAR).” (D.I. 484 at 2).

Stopler is directed to data communications and processing. (Stopler at Abstract). Stopler does not address the problem of lowering PAR, but instead seeks to mitigate interference in data communications. (*Id.*). Specifically, Stopler states, “The present invention is for an encoding/framing scheme for multitone modulation over impulsive channels. The encoding/framing scheme allows efficient operation in multipoint to point channels which are affected by ingress (narrowband noise) and impulsive (burst) interference.” (*Id.* at col. 5:10-14). Stopler uses a “diagonalization scheme” where packets are spread over the various carriers over time, which reduces the effect of a burst of noise on an individual user’s packets. (*Id.* at col. 5:64-67).

Stopler does not discuss PAR, but it does briefly mention phase scrambling: “In order to randomize the overhead channel symbols, a phase scrambling sequence is applied to the output symbols. However, to simplify implementation, the phase scrambler is applied to all symbols, not just the overhead symbols.” (*Id.* at col. 12:24-28). Stopler suggests using a “pseudo-random generator,” which produces numbers that correspond with the phase rotations of the symbols. (*Id.* at col. 12:28-45).

Defendant argues that Stopler teaches all elements of and, thus, anticipates Claim 26 of the ’627 Patent. (D.I. 1461 at 7). Plaintiff counters that Stopler does not anticipate this claim as (1) it does not result in a transmission signal with a reduced PAR and (2) it does not “adjust the phase characteristics of the carrier signals by varying amounts to produce a transmission signal with a reduced peak-to-average power ratio (PAR).” (D.I. 1519 at 6-10).

The parties dispute whether the technique disclosed by Stopler “adjust[s] the phase characteristics of the carrier signals by varying amounts.”

Defendant's expert, Dr. Leonard Cimini, Jr., points to a table in Stopler and describes how the output pair generated by a pseudo-random number generator is converted into a phase rotation of 0, $\pi/2$, π , or $-\pi/2$. (D.I. 1475-1, Exh. A at 73 of 281). He opines, "[T]he computed phase rotation of Stopler can be 0, 90, 180, or 270 degrees. Thus the phase characteristics are adjusted by varying amounts." (*Id.* at 74 of 281).

Plaintiff's expert, Dr. Vijay Madisetti, disagrees. Dr. Madisetti opines, "Stopler discloses rotating the phases of all carriers within a multicarrier symbol (*e.g.*, DMT [discrete multi-tone] symbol) by the same amount." (D.I. 1475-2, Exh. B at 25 of 95). Dr. Madisetti states, "[A] POSITA would understand that Stopler uses the output of the pseudo-random generator to adjust the phase characteristics of all the carrier signals by the same amount of rotation, not by varying amounts as required by the claims." (*Id.*). The parties' experts dispute whether Stopler adjusts the phase characteristics of the carrier signals by the same amount of rotation or by varying amounts of rotation. This is a genuine dispute of material fact, and summary judgment on this issue in favor of either party would be inappropriate.

The parties also dispute whether Stopler's phase scrambling would reduce the PAR of the transmission signal. Dr. Cimini opines, "[W]ith regard to producing a transmission signal with a reduced peak-to-average power ratio (PAR), one of ordinary skill in the art would understand that applying a random phase rotation to the QAM symbols using the phase scrambler according to Stopler would result in a transmission signal with a reduced peak-to-average power ratio a non-trivial percentage of the time." (D.I. 1475-1, Exh. A at 74-75 of 281).

In contrast, Dr. Madisetti states, "[M]y opinion is that PAR is not reduced in Stopler because the QAM symbols within a DMT symbol are subject to the same rotation." (D.I. 1475-2, Exh. B at 25 of 95). Dr. Madisetti explains, "Stopler's invention is described in the context of

transmitting user (payload) data,” and, “Where payload data is transmitted, particularly on carriers having variable bit loading and using a bit scrambler, it is not reasonable to assume (as Dr. Cimini appears to have done) that further random phase rotation will reduce PAR.” (*Id.* at 29-30 of 95). Dr. Madisetti opines, “[A] POSITA would not understand Stopler to disclose or contemplate a scheme for reducing PAR.” (*Id.* at 30 of 95). The parties’ experts disagree on whether Stopler reduces PAR of a transmission signal.

In a related case I noted, “Reducing PAR is clearly not the intended function of Stopler.” *TQ Delta, LLC v. Adtran, Inc.*, 2020 WL 3060751, at *4 (D. Del. June 9, 2020). Stopler does not mention PAR. In a proceeding involving a related patent, the Federal Circuit stated, “Stopler provides no express discussion of, nor any connection to, the PAR of a multicarrier transmitter.” *TQ Delta, LLC v. Cisco Sys., Inc.*, 942 F.3d 1352, 1362 (Fed. Cir. 2019). In *Cisco*, the Federal Circuit determined that the patent at issue was not obvious over Stopler and another prior art reference. Specifically, the Federal Circuit concluded that there was not substantial evidence that a POSITA would be motivated to use the phase scrambler in Stopler as a solution to reduce PAR. *Id.* However, obviousness involves a different analysis than anticipation. The Federal Circuit did not address the question of whether Stopler inherently reduces PAR without it being an obvious solution to one of skill in the art.

The fact that Stopler “provides no express discussion of, nor any connection to” PAR does not settle the anticipation inquiry. “[A] prior art reference may anticipate without disclosing a feature of the claimed invention if that missing characteristic is necessarily present, or inherent, in the single anticipating reference . . . [I]nherent anticipation [does not] require[] recognition in the prior art.” *Schering Corp. v. Geneva Pharm.*, 339 F.3d 1373, 1377 (Fed. Cir. 2003). As the parties’ experts dispute whether a POSITA would understand Stopler to reduce PAR and the

Federal Circuit's inquiry in *Cisco* did not involve anticipation, there is a genuine dispute of material fact. Both motions for summary judgment on this issue are denied.

**B. Obviousness of Claim 14 of the '008 Patent and Claim 14 of the '041 Patent:
Combination of Stopler and Admitted Prior Art**

Defendant argues that the combination of Stopler and the Admitted Prior Art (that is, prior art as described by the asserted patents) renders Claim 14 of the '008 Patent and Claim 14 of the '041 Patent obvious. (D.I. 1461 at 1). Defendant asserts that the '134 Provisional Application to which the Family 4 Patents claim priority contains admissions about the prior art, including, "DMT modems existed at the time of the application," and, "[M]odulating and demodulating the same bit values on multiple carriers was a known method for reducing bit error rates." (*Id.* at 6). Defendant contends that there would be motivation to combine because a POSITA would recognize that randomizing phases, taught by Stopler, would reduce the problem of high PAR. (*Id.* at 12). Dr. Cimini opines that the Admitted Prior Art discloses multicarrier communication methods, and a POSITA would have been motivated to combine "methods of randomizing the phases of carriers, such as those described in Stopler, to solve the issue of high peak-to-average ratio and signal clipping by increasing the randomness of a signal." (D.I. 1475-1, Exh. A at 93-95 of 281).

Plaintiff counters that the combination of Stopler and the Admitted Prior Art does not render these claims obvious as (1) Stopler does not produce a transmission signal with a reduced PAR or adjust the phase characteristics of the carrier signals by varying amounts; (2) Defendant mischaracterizes the Provisional Application; and (3) a POSITA would not be motivated to combine Stopler with the Admitted Prior Art. (D.I. 1519 at 15-16).

There is a disputed material fact as to whether Stopler reduces the PAR of transmission signals. Based on this, there is a disputed material fact regarding whether a POSITA would be

motivated to combine Stopler with the multicarrier communication methods disclosed in the Admitted Prior Art. If Stopler does not reduce PAR, there would likely be no motivation for a POSITA to combine it with the admitted prior art. Therefore, summary judgment of invalidity on this ground is inappropriate. It is for the jury to decide whether Stopler reduces PAR and whether a POSITA would be motivated to combine it with the Admitted Prior Art.

C. Anticipation of Claim 26 of the '627 Patent by Jones

Plaintiff argues that it is entitled to summary judgment of no invalidity as Jones does not anticipate Claim 26 of the '627 Patent. (D.I. 1471 at 8). Plaintiff contends that there is no evidence that Jones discloses (1) the “substantially scrambled” limitation or (2) that the value associated with each carrier signal varies with each DMT symbol. (*Id.* at 8-11). Defendant counters that Jones discloses both of those limitations. (D.I. 1513 at 12-15).

Jones is directed to “digital communication systems employing orthogonal frequency division multiplexing (OFDM).” (Jones at col. 1:26-28). “OFDM divides the available spectrum within a channel into narrow subchannels.” (*Id.* at col. 2:2-4). In a “burst,” each subchannel in an OFDM system transmits one data symbol. (*Id.* at col. 2:4-5). Jones claims “[s]ystems and methods for efficient multiplexing of multiple access requests from disparate sources within a single OFDM burst.” (*Id.* at col. 2:51-53).

Jones describes a phase scrambling technique in at least one embodiment. (*Id.* at cols. 5:30-6:24). Jones states:

The phase scrambling pattern consists of a series of values ranging from 0 to 3. A phase scrambling storage block **410** generates the values of the pattern in succession. A complex exponential block **412** represents the translation of the values ranging from 0 through 3 into four possible phase rotation values: 0, $\pi/2$, π , $3\pi/2$.

(*Id.* at col. 6:1-6).

There is a genuine dispute of material fact as to whether Jones discloses that the value associated with each carrier signal varies with each DMT signal.

Dr. Cimini opines that Jones discloses the use of a pseudo-random number generator to generate a value associated with each carrier signal and does not describe that this process would restart at each symbol period. (D.I. 1475-1, Exh. A at 136 of 281). Dr. Cimini states:

[O]ne of ordinary skill in the art would understand that the process used to generate the random vector would continue to operate from one DMT symbol to the next symbol without restarting. If the generator is not restarted at the beginning of the DMT symbol (and using the same start value for the sequence), then the value for each carrier would vary between different DMT symbols.

(*Id.*). He further opines:

As a natural consequence, the value assigned to each respective subcarrier would not be the same for each symbol period, and thus would, in most instances, vary between DMT symbols. Because the sequence is random, and the set of pseudo-random numbers is finite (four values in the case of Jones – 0, 1, 2, and 3), there may be instances where the value is the same between DMT symbols. But these are coincidences. Accordingly, it is my opinion that it is inherent from the disclosure of Jones that the “value” associated with each subcarrier would vary with each DMT symbol.

(*Id.* at 137 of 281). In other words, it is Dr. Cimini’s opinion that the process used to generate the random vector will operate continuously from one DMT symbol to the next, and that will cause the value for each carrier to vary.

Dr. Madisetti, in contrast, opines that the pseudo-random number generator does not run continuously, as if it did, “the headend would not be able to decode the [request access (“RA”)] data successfully.” (D.I. 1475-2, Exh. B at 48 of 95). He continues, “If the Jones system used a pseudo-random number generator (PRBS) that ran continuously, as claimed by Dr. Cimini, a subscriber who wants to send an RA burst would not know what the current state of the PRBS was at the headend,” and the subscriber “would never be able to send data upstream.” (*Id.* at 48-49 of 95). Dr. Madisetti’s opinion is that a continuously running pseudo-random number

generator would not facilitate sending data upstream, but, “[I]f Jones uses a series scrambling sequence (i.e., a repeating pattern of 0, 1, 2, 3) that resets every DMT symbol then the subscriber and the head end will always know what phase scrambling values to use on each carrier.” (*Id.* at 49 of 95).

The parties’ experts dispute whether Jones discloses the limitation that the “value [associated with each carrier signal] varies with each DMT symbol.” This is a genuine dispute of material fact in the determination whether Jones anticipates Claim 26 of the ’627 Patent. For this reason, summary judgment on this issue is denied.

D. Anticipation by Jones of Claim 14 of the ’041 Patent and Claim 14 of the ’008 Patent

Plaintiff argues that Jones does not anticipate Claim 14 of the ’041 Patent and Claim 14 of the ’008 Patent and moves for summary judgment of no invalidity on those grounds. (D.I. 1471 at 12-13). Plaintiff contends that Jones does not disclose (1) the “substantially scrambled” limitation and (2) “a value determined using a pseudo-random number generator.” (*Id.* at 12). Defendant counters that it has admissible evidence that these limitations are met by Jones, which precludes the granting of summary judgment of no invalidity on this ground.

I agree with Defendant. There is a genuine issue of material fact regarding whether Jones discloses “a value determined using a pseudo-random number generator.” The parties’ experts disagree as to whether Jones discloses this limitation. Jones describes:

The phase scrambling pattern consists of a series of values ranging from 0 to 3. A phase scrambling storage block 410 generates the values of the pattern in succession.

(Jones at col. 6:1-2).

Dr. Madisetti opines that Jones does not disclose values generated by a pseudorandom number generator, as the values generated are “in succession.” Dr. Madisetti states, “A POSITA

would recognize that a series of successive values, 0, 1, 2, and 3, would be generated by, for example, a 4-bit serial-to-parallel convertor, not a pseudo-random number generator.” (D.I. 1475-2, Exh. B at 50 of 95). Therefore, in Dr. Madisetti’s opinion, “[T]he phase scrambling pattern is not pseudo-random” (*id.* at 51 of 95), and, “Jones does not disclose ‘associating each carrier signal with a value . . . determined using a pseudorandom number generator,’ as recited by claim 14 of the [’]041 patent” (*id.* at 53 of 95).

Dr. Cimini disagrees: “[A] person of ordinary skill in the art would, given Jones’ disclosure, understand that Jones’ phase scrambling pattern is generated by a pseudo-random number generator.” (D.I. 1475-1, Exh. A at 144 of 281). Dr. Cimini bases this opinion on a section in Jones that describes the process and result of retransmitting a burst access request. (*Id.*). Dr. Cimini opines:

This would not result if the sequence was constant, because then, moving to a different tone set would not result in moving to a different portion of the sequence. Nor would it be the result if the sequence was periodic, because similarly, moving to a different tone set would not necessarily result in moving to a meaningfully different portion of the sequence, because the new tone set might coincide with the same period of the sequence.

(*Id.*). Dr. Cimini’s opinion is that Jones discloses values resulting from a pseudo-random phase generator. (*See id.* at 143-45 of 281).

The parties’ experts dispute whether Jones discloses values determined in sequence (not by a pseudo-random number generator) or by a pseudo-random number generator. This precludes summary judgment on anticipation of Claim 14 of the ’041 Patent and Claim 14 of the ’008 Patent by Jones.

E. Obviousness: Combination of Hwang and Hayashino

Defendant argues that the Asserted Claims are rendered obvious by the combination of Hayashino and Hwang. Defendant contends that Plaintiff does not dispute that factual

disclosures of the references and that a POSITA would be motivated to combine the references because both “relate to high-speed multicarrier modulation” and “recognize issues with high peak-to-average ratio and redundant transmission.” (D.I. 1461 at 17). Plaintiff, meanwhile, moves for summary judgment of no invalidity on this ground. Plaintiff argues that there is no evidence that (1) the combination of Hayashino and Hwang disclose the “substantially scramble” limitation; and (2) a POSITA would not be motivated to combine the teachings of the two references. (D.I. 1471 at 14-15).

Hwang describes a multicarrier communication system that uses DMT modulation to transmit data over a channel. (Hwang at cols. 5:12-6:21; D.I. 1475-1, Exh. A at 63 of 281). Hayashino is directed to methods of OFDM. (Hayashino at col. 1:7-9; D.I. 1475-1, Exh. A at 58 of 281). Hayashino teaches that high PAR can occur when transmission signals are in phase with each other and discloses a process for scrambling phase characteristics of carrier signals. (Hayashino at cols. 2:65-3:36, 12:27-48; D.I. 1475-1, Exh. A at 59 of 281). Defendant maintains that the combination of these two prior art references renders the Asserted Claims obvious. (D.I. 1461 at 12).

Dr. Cimini states, “Hwang therefore proposes to increase the number of carriers modulated with the same bits, which, in turn, would increase the probability of constructive interference, and a high peak-to-average ratio[.]” (D.I. 1475-1, Exh. A at 238 of 281). Dr. Cimini opines, “[O]ne of ordinary skill in the art would have been motivated to combine the teachings of Hayashino, and its methods for phase scrambling, with the teachings of Hwang, with its reference to multicarrier communications systems and increased probability of high peak to average ratio.” (*Id.* at 241 of 281).

Dr. Madisetti disagrees. In Dr. Madisetti's opinion, Hwang's disclosure "does not result in a PAR problem." (D.I. 1475-2, Exh. B at 73 of 95). Dr. Madisetti opines that the "differential coder" taught by Hwang would not increase PAR. (*Id.* at 73-75 of 95). Dr. Madisetti states, "[A] POSITA would recognize that Hwang does not have a PAR that needs to be addressed/remedied. Accordingly, a POSITA would not be motivated to modify Hwang with any PAR reducing technique or with Hayashino." (*Id.* at 77 of 95).

The parties' experts dispute whether the system disclosed by Hwang increases PAR. This creates a genuine issue of material fact, as if PAR is not increased in Hwang, a POSITA would not be motivated to combine Hwang with the phase scrambling techniques disclosed in Hayashino. Therefore, Defendant's motion for summary judgment of invalidity and Plaintiff's motion for summary judgment of no invalidity are denied on this ground.

F. Obviousness: Combination of Stopler and Hwang

Plaintiff argues that it is entitled to summary judgment of no invalidity on this ground as the combination of Stopler and Hwang do not render the Asserted Claims obvious. (D.I. 1471 at 14-16). Plaintiff asserts that there is no evidence that the combination discloses the "substantially scramble" limitation or that a POSITA would be motivated to combine the references. (*Id.*). Defendant contends that it has carried its burden to show that the combination meets the "substantially scramble" limitation and that a POSITA would be motivated to combine the references. (D.I. 1513 at 17).

Dr. Cimini opines that a POSITA would be motivated to combine the "methods for phase scrambling" disclosed in Stopler with the "teachings of Hwang, with its reference to multicarrier communications systems and increased probability of high peak to average ratio." (D.I. 1475-1, Exh. A at 278 of 281). Dr. Madisetti states, "Hwang's differential coding technique does not

result in a PAR problem,” and thus, “[A] POSITA would not be motivated to modify Hwang with any PAR reducing technique or with Stopler (even if one were to incorrectly assume that Stopler reduces PAR).” (D.I. 1475-2, Exh. B at 80 of 95).

Disputed material facts preclude the granting of summary judgment on this combination. As previously discussed, there is a disputed material fact as to whether Stopler’s disclosed phase scrambling would reduce PAR. Further, whether the communication system disclosed by Hwang has a PAR problem is also a disputed issue of material fact. Therefore, it is also disputed whether a POSITA would be motivated to combine Stopler and Hwang, because if Stopler does not reduce PAR or if Hwang does not disclose a system with increased PAR, there would be no motivation to combine these prior art references. Therefore, summary judgment for this combination is denied.

G. Obviousness: Combination of T1.413-1998 and Hayashino

Plaintiff argues that the combination of T1.413-1998 and Hayashino do not render the Asserted Claims obvious. (D.I. 1471 at 16). Defendant maintains that it has adduced sufficient evidence to show that the combination of these references meets the “substantially scramble” limitation of the Asserted Claims and that a POSITA would be motivated to combine the two references. (D.I. 1513 at 17-18).

T1.413-1998 is a technical standard relating to “Asymmetrical Digital Subscriber Line (ADSL) Equipment” published in 1998. (D.I. 1475-1, Exh. A at 55-56 of 281). T1.413-1998 “discloses a reference model for data transmission” and was intended to define the minimal requirements for satisfactory transmission of such data. (*Id.* at 56 of 281).

Dr. Cimini opines that one of ordinary skill in the art would have been motivated to combine the teachings of Hayashino and T1.413-1998 as both “recognize the same problem –

signal clipping as a result of a signal with a high peak-to-average ratio.” (*Id.* at 221 of 281). Dr. Cimini explains that T1.413-1998 discusses initialization methods that carry the same input bits on multiple carriers, which can cause increased PAR. (*Id.* at 221-23 of 281). In Dr. Cimini’s opinion, a POSITA “would be motivated to use the phase scrambling techniques in Hayashino, which solve the problem of high peak-to-average ratio and signal clipping, to solve the same problem in T1.413-1998.” (*Id.* at 221 of 281).

Dr. Madisetti, however, reviewed simulations of the system described by T1.413-1998 and states, “[T]he T1.413-1998 initialization scheme will never exhibit a PAR that is problematic or that requires a remedy. Accordingly, contrary to Dr. Cimini’s opinions, a POSITA would not be motivated to modify T1.413-1998 to attempt to reduce PAR or to combine it with the teachings of Hayashino.” (D.I. 1475-2, Exh. B at 67-70 of 95).

Thus, there is a genuine dispute of material fact over whether a POSITA would be motivated to combine T1.413-1998 with Hayashino. The parties’ experts disagree as to whether T1.413-1998 describes a system with increased PAR, and if there is no increased PAR, a POSITA would not be motivated to combine it with a phase scrambling technique. For that reason, summary judgment on this ground is denied.

H. Obviousness: Combination of Shively and Hayashino

Plaintiff argues that the combination of prior art references Shively and Hayashino do not render the Asserted Claims obvious, and therefore, it is entitled to summary judgment of no invalidity. (D.I. 1471 at 19-20). Defendant maintains that it has shown sufficient evidence that a POSITA would be motivated to combine these references. (D.I. 1513 at 19-20).

Shively “relates to discrete multitone transmission (DMT) of data by digital subscriber loop (DSL) modems and more specifically to the allocation of bits, respectively, to the discrete

multitones.” (Shively at col. 1:5-8). Shively’s bit allocation technique suggests transmitting the same data on multiple subchannels to compensate for noisy environments. (*Id.* at col. 15:47-52).

Dr. Cimini opines that Shively discloses a multicarrier transmission system where multiple carriers are used to carry the same input bits, and that, in such a system, performance can suffer due to high PAR and signal clipping. (D.I. 1475-1, Exh. A at 264-65 of 281). Based on this, and Dr. Cimini’s analysis of Hayashino, he opines, “[O]ne of ordinary skill in the art would have been motivated to combine the teachings of Hayashino, and its methods for phase scrambling, with the teachings of Shively, with its reference to multicarrier communications systems and increased probability of high peak to average ratio.” (*Id.* at 267 of 281).

Dr. Madisetti, however, opines that a POSITA would not be motivated to combine Shively and Hayashino. Dr. Madisetti, after reviewing simulations, determined it “is wrong to conclude[] that Shively suffers from signal clipping at an unacceptable rate,” and thus, a “POSITA would not perceive Shively as having a problematic PAR.” (D.I. 1475-2, Exh. B at 55 of 95). He concludes, “Shively’s technique does not cause an increase in PAR that would violate the prescribed clipping rate of the relevant DSL standards, [so] a POSITA would not be motivated to modify Shively with a PAR reduction technique.” (*Id.* at 87 of 95).

There is a genuine dispute of material fact regarding whether a POSITA would be motivated to combine Shively and Hayashino. If Shively’s disclosed system does not result in a problematic PAR, a POSITA would not be motivated to combine it with the phase scrambling taught in Hayashino. Summary judgment of no invalidity, therefore, cannot be granted on this ground.

IV. CONCLUSION

Defendant's Motion for Summary Judgment of Invalidity of the Family 4 Patents is denied. Plaintiff's Motion for Summary Judgment of No Invalidity is denied.

A separate order will be entered.